placed in a non-interest bearing account. This adjustment should correct for the anticipated effects of inflation over the time estimated to complete expenditures for the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources.

(2) In order to make the adjustment in paragraph (b)(1) of this section, the authorized official should adjust the damage amount by the rate payable on notes or bonds issued by the United States Treasury with a maturity date that approximates the length of time estimated to complete expenditures for the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources.

(c) *Payments from the account.* Monies that constitute the damage claim amount shall be paid out of the account established pursuant to paragraph (a) of this section only for those actions described in the Restoration Plan required by §11.93 of this part.

[53 FR 5176, Feb. 22, 1988, as amended at 59 FR 14287, Mar. 25, 1994]

§11.93 Post-assessment phase—restoration plan.

(a) Upon determination of the amount of the award of a natural resource damage claim as authorized by section 107(a)(4)(C) of CERCLA, or sections 311(f)(4) and 311(f)(5) of the CWA, the authorized official shall prepare a Restoration Plan as provided in section 111(i) of CERCLA. The plan shall be based upon the Restoration and Compensation Determination Plan described in §§11.81 of this part. The Plan shall describe how the monies will be used to address natural resources, specifically what restoration, rehabilitation, replacement, or acquisition of the equivalent resources will occur. When damages for compensable value have been awarded, the Plan shall also describe how monies will be used to address the services that are lost to the public until restoration, rehabilitation, replacement, and/or acquisition of equivalent resources is completed. The Restoration Plan shall be prepared in accordance with the guidance set forth in §11.81 of this part.

(b) No restoration activities shall be conducted by Federal agencies that would incur ongoing expenses in excess of those that would have been incurred under baseline conditions and that cannot be funded by the amount included in the separate account established pursuant to §11.92(a) of this part unless such additional monies are appropriated through the normal appropriations process.

(c) Modifications may be made to the Restoration Plan as become necessary as the restoration proceeds. Significant modifications shall be made available for review by any responsible party, any affected natural resource trustees, other affected Federal or State agencies or Indian tribes, and any other interested members of the public for a period of at least 30 days, with reasonable extensions granted as appropriate, before tasks called for in the modified plan are begun.

(d) If the measure of damages was determined in accordance with subpart D, the restoration plan may describe actions to be taken that are to be financed from more than one damage award, so long as the actions are intended to address the same or similar resource injuries as those identified in each of the subpart D assessment procedures that were the basis of the awards.

[51 FR 27725, Aug. 1, 1986, as amended at 52 FR 9100, Mar. 20, 1987; 53 FR 5176, Feb. 22, 1988; 59 FR 14287, Mar. 25, 1994]

APPENDIX I TO PART 11—METHODS FOR ESTIMATING THE AREAS OF GROUND WATER AND SURFACE WATER EXPOSURE DURING THE PREASSESSMENT SCREEN

This appendix provides methods for estimating, as required in §11.25 of this part, the areas where exposure of ground water or surface water resources may have occurred or are likely to occur. These methods may be used in the absence of more complete information on the ground water or surface water resources.

Ground Water

The longitudinal path length (LPL) factors in table 1 are to be applied in estimating the area potentially exposed downgradient of the known limit of exposure or of the boundary of the site. Estimates of lateral path width (LPW) are to be used when the LPW exceeds the width of the plume as determined from available data, or when the width of the plume at the boundary of the site is estimated as less than the LPW. In the absence

of data to the contrary, the largest values of LPL and LPW consistent with the geohydrologic data available shall be used to make the estimates required in the preassessment screen. An example computation using the LPL and LPW factors follows table 1.

TABLE 1—FACTORS FOR ESTIMATION OF AREAS POTENTIALLY EXPOSED VIA THE GROUND WATER PATHWAY

Aquifer type	Hyd. conductivity/porosity factor (miles/year)	Hydraulic gradient estimate (feet/mile)	Time since release began (in years)	Longitudinal path length (in feet)	Lateral path width (in feet)
Sand	50	×	×	=	LPW=0.2LPL
Sand+silt	0.5	×	×	=	LPW=0.3LPL
Gravel	6000	×	×	=	LPW=0.2LPL
Sandstone	0.01	×	×	=	LPW=0.4LPL
Shale	3×10^{-6}	×	×	=	LPW=0.8LPL
Karst Limestone or Dolomite	10	×	×	=	LPW=0.2LPL
Limestone or Dolomite	0.01	×	×	=	LPW=0.4LPL
Fractured Crystalline Rocks	0.3	×	×	=	LPW=0.3LPL
Dense Crystalline Rocks	1×10^{-5}	×	×	=	LPW=0.8LPL

EXAMPLE OF COMPUTATION FOR ESTIMATING THE AREA POTENTIALLY EXPOSED VIA GROUND WATER PATHWAY

A release of hazardous substances occurs from a facility located in a glacial valley. Available data indicate the release may have occurred intermittently over a period of almost 1 year, although only one well about 300 feet downgradient of the facility boundary had detectable quantities of contaminants. The contaminated well is screened in the water table aquifer composed of gravelly sands. The facility boundary nearest the contaminated well is almost 3,000 feet in length, but a review of available data determined the release is probably localized along a 500-foot section of the boundary where a stream leaves the facility. Available water table data indicate hydraulic gradients in the valley range from 0.005 feet/mile up to 0.25 feet/mile near pumping wells. No pumping wells are known to be located near the release, and a mean hydraulic gradient of 0.1 feet/mile is estimated in the vicinity of the release site. Using the gravel factor from table 1, the LPL and LPW are estimated:

6000×0.1×1=600 feet (LPL)

and

600×0.2=120 feet (LPW).

Since the estimated LPW (120 feet) is less than the plume width (500 feet) determined from other available data, the greater number is used to compute the area potentially exposed:

(1) 600 feet×500 feet=300,000 square feet (about 6.9 acres). The available information allows an initial determination of area potentially exposed via the ground water pathway to be estimated:

(2) 300 feet×500 feet=150,000 square feet (about 3.5 acres).

The total area potentially exposed is the sum of (1) and (2):

6.9+3.5=10.4 acres.

Surface Water

The area of surface water resources potentially exposed should be estimated by applying the principles included in the examples provided below.

Example 1: A release occurs and most of the oil or hazardous substance enters a creek, stream, or river instantaneously or over a short time interval (pulse input is assumed). The maximum concentration at any downstream location, past the initial mixing distance, is estimated by:

$C_p=25(W_i)/(T^{0.7}\ Q)$

where C_p is the peak concentration, in milligrams/liter (mg/L),

W_i is the total reported (or estimated) weight of the undiluted substance released, in pounds,

Q is the discharge of the creek, stream, or river, in cubic feet/second, and

T is the time, in hours, when the peak concentration is estimated to reach a downstream location L, in miles from the entry point.

The time T may be estimated from:

$T=1.5(L)/V_s$

where T and L are defined as above and

V_s is the mean stream velocity, in feet per second.

The mean stream velocity may be estimated from available discharge measurements or from estimates of slope of the water surface S (foot drop per foot distance downstream) and estimates of discharge Q (defined above) using the following equations:

for pool and riffle reaches $V_s=0.38(Q^{0.40})(S^{0.20})$, or

for channel-controlled reaches $V_s=2.69(Q^{0.26})(S^{0.28})$.

Estimates of S may be made from the slope of the channel, if necessary.

As the peak concentrations become attenuated by downstream transport, the plume containing the released substance becomes elongated. The time the plume might take to pass a particular point downstream may be estimated using the following equation:

$T_p=9.25\times10^6\ W_i/(QC_p)$

where

T_p is the time estimate, in hours, and W_i, C_p, and Q are defined above.

Example 2: A release occurs and most of the oil or hazardous substance enters a creek, stream, or river very slowly or over a long time period (sustained input assumed). The maximum concentration at any downstream location, past the initial mixing distance, is estimated by:

$C_p=C(q)/(Q+$

where C_p and Q are defined above,

C is the average concentration of the released substance during the period of release, in mg/L, and

q is the discharge rate of the release into the streamflow, in cubic feet/second.

For the above computations, the initial mixing distance may be estimated by:

$L_m=(1.7\times10^{-5})V_s\ B^2/(D^{1.5}\ S^{0.5})$

where

L_m is the initial mixing distance, in miles,

V_s is defined above,

B is the average stream surface width, in ft,

D is the mean depth of the stream, in ft, and

S is the estimated water-surface slope, in ft/ft.

Example 3: A release occurs and the oil or hazardous substance enters a pond, lake, reservoir, or coastal body of water. The concentration of soluble released substance in the surface water body may be estimated by:

$C_p=CV_c/(V_w+V_c)$

where

C_p and C are defined above,

V_c is the estimated total volume of substance released, in volumetric units, and

V_w is the estimated volume of the surface water body, in the same volumetric units used for V_c.

[51 FR 27725, Aug. 1, 1986, as amended at 52 FR 9100, Mar. 20, 1987]

APPENDIX II TO PART 11—FORMAT FOR DATA INPUTS AND MODIFICATIONS TO THE NRDAM/CME

This appendix specifies the format for data inputs and modifications to the NRDAM/CME under §11.41. Consult the back of this appendix for definitions.

Starting Point for the NRDAM/CME

The NRDAM/CME begins its calculations at the point that the released substance entered water in an area represented by its geographic database. Any water within the geographic boundaries of the NRDAM/CME is a ''coastal or marine environment.'' The authorized official must determine all data inputs and modifications as of the time and location that the released substance entered a coastal or marine environment. In the case of a release that began in water in an area within the boundaries of the NRDAM/CME, this point will be the same as the point of the release. However, for releases that begin on land or that begin outside the boundaries of the NRDAM/CME, this point will not be the point of the release but rather the point at which the released substance migrates into a coastal or marine environment.

Required Data Inputs

Documentation of the source of the data inputs; and

Identity of Substance

For release of single substance:

Name of the substance that entered a coastal or marine environment as it appears in Table 7.1, Volume I of the NRDAM/CME technical document (incorporated by reference, see §11.18).

For releases of two or more substances or a release of a mixture of two or more substances:

Name of only one of the substances that entered a coastal or marine environment as it appears in Table 7.1, Volume I of the NRDAM/CME technical document.

Mass or Volume

For release of single substance:

Mass or volume of identified substance that entered a coastal or marine environment stated in tonnes, barrels, gallons, liters, pounds, or kilograms.

For releases of two or more substances or a release of a mixture of two or more substances:

Mass or volume of the one identified substance (rather than total mass) that entered a coastal or marine environment stated in tonnes, barrels, gallons, liters, pounds, or kilograms.

Duration

Length of time over which the identified substance entered a coastal or marine environment stated in hours.